

WHAT IS CLAIMED IS:

1. A semiconductor device comprising:

a gate insulation film which is formed on a semiconductor substrate and includes a silicon oxide-based insulation film, a high dielectric constant film formed on the silicon oxide-based insulation film, and an oxygen diffusion preventing film formed on the high dielectric constant film and having a lower oxygen diffusion coefficient than the high dielectric constant film; and

a gate electrode formed on the gate insulation film.

2. A semiconductor device comprising:

a first gate insulation film formed on a first region of a semiconductor substrate and including a silicon oxide-based insulation film, a high dielectric constant film formed on the silicon oxide-based insulation film, and an oxygen diffusion preventing film formed on the high dielectric constant film and having a lower oxygen diffusion coefficient than the high dielectric constant film;

a first gate electrode formed on the first gate insulation film;

a second gate insulation film formed on a second region of the semiconductor substrate and including the high dielectric constant film and the oxygen diffusion preventing film formed on the high dielectric constant

film; and

    a second gate electrode formed on the second gate insulation film.

3. A semiconductor device according to claim 1, wherein

    the high dielectric constant film is a hafnium oxide film or a zirconium oxide film.

4. A semiconductor device according to claim 2, wherein

    the high dielectric constant film is a hafnium oxide film or a zirconium oxide film.

5. A semiconductor device according to claim 1, wherein

    the oxygen diffusion preventing film is a silicon nitride film, an alumina film, an aluminum silicate film, a hafnium aluminate film or a hafnium silicate film.

6. A semiconductor device comprising:

    a gate insulation film formed on a semiconductor substrate, and including a silicon oxide-based insulation film and a reduction-retardant high dielectric film formed on the silicon oxide-based insulation film; and

    a gate electrode formed on the gate insulation film.

7. A semiconductor device comprising:

    a first gate insulation film formed on a first region of a semiconductor substrate and including a silicon oxide-based insulation film and a reduction-

retardant high dielectric constant film formed on the silicon oxide-based insulation film;

a first gate electrode formed on the first gate insulation film;

a second gate insulation film formed on a second region of the semiconductor substrate and including the high dielectric film; and

a second gate electrode formed on the second gate insulation film.

8. A semiconductor device according to claim 6, wherein

the high dielectric film is a hafnium aluminate film.

9. A semiconductor device according to claim 7, wherein

the high dielectric film is a hafnium aluminate film.

10. A semiconductor device according to claim 8, wherein

an alumina content ratio of the hafnium aluminate film is above 50 % including 50 %.

11. A semiconductor device according to claim 9, wherein

an alumina content ratio of the hafnium aluminate film is above 50 % including 50 %.

12. A method for fabricating a semiconductor device

comprising the steps of:

forming a silicon oxide-based insulation film on a semiconductor substrate;

forming a high dielectric constant film on the silicon oxide-based insulation film;

forming on the high dielectric constant film an oxygen diffusion preventing film having a lower oxygen diffusion coefficient than the high dielectric constant film; and

forming a gate electrode on the oxygen diffusion preventing film.

13. A method for fabricating a semiconductor device comprising the steps of:

forming a silicon oxide-based insulation film on a semiconductor substrate in a first region;

forming a high dielectric constant film on the silicon oxide-based insulation film in the first region and on the semiconductor substrate in a second region;

forming an oxygen diffusion preventing film having a lower oxygen diffusion coefficient than the high dielectric constant film on the high dielectric constant film in the first region and on the high dielectric constant film in the second region; and

forming a first gate electrode on the oxygen diffusion preventing film in the first region and a second gate electrode on the oxygen diffusion preventing

film in the second region.

14. A method for fabricating a semiconductor device according to claim 12, wherein

in the step of forming the high dielectric constant film, the high dielectric constant film is formed of a hafnium oxide film or a zirconium oxide film.

15. A method for fabricating a semiconductor device according to claim 13, wherein

in the step of forming the high dielectric constant film, the high dielectric constant film is formed of a hafnium oxide film or a zirconium oxide film.

16. A method for fabricating a semiconductor device according to claim 12, wherein

in the step of forming the oxygen diffusion preventing film, the oxygen diffusion preventing film is formed of a silicon nitride film, an alumina film, an aluminum silicate film, a hafnium aluminate film or a hafnium silicate film.

17. A method for fabricating a semiconductor device comprising the steps of:

forming a silicon oxide-based insulation film on a semiconductor substrate;

forming a reduction-retardant high dielectric constant film on the silicon oxide insulation film; and

forming a gate electrode on the high dielectric constant film.

18. A method for fabricating a semiconductor device comprising the steps of:

forming a silicon oxide-based insulation film on a semiconductor substrate in a first region;

forming a reduction-retardant high dielectric constant film on the silicon oxide-based insulation film in the first region and on the semiconductor substrate in a second region; and

forming a first gate electrode on the high dielectric constant film in the first region and a second gate electrode on the high dielectric constant film in the second region.

19. A method for fabricating a semiconductor device according to claim 17, wherein

in the step of forming the high dielectric constant film, the high dielectric constant film is formed of a hafnium aluminate film.

20. A method for fabricating a semiconductor device according to claim 18, wherein

in the step of forming the high dielectric constant film, the high dielectric constant film is formed of a hafnium aluminate film.

21. A method for fabricating a semiconductor device according to claim 19, wherein

an alumina content ratio of the hafnium aluminate film is above 50 % including 50 %.

22. A method for fabricating a semiconductor device according to claim 20, wherein

an alumina content ratio of the hafnium aluminate film is above 50 % including 50 %.

23. A method for fabricating a semiconductor device according to claim 12, wherein

the step of forming the gate electrode includes the step of forming a conducting film in a reducing atmosphere and the step of patterning the conducting film into the gate electrode.